

## Crystalline Silica: Hazards and Precautions

### Introduction

Starting June 23, 2017, the Occupational Safety and Health Administration (OSHA) mandates all employers to comply with a new standard for the control of employee exposure to Crystalline Silica (CS). This guide will help readers navigate the hazards, exposures and controls to reduce the risk of employee illness from CS exposure.

Please note, the information below is intended to provide a place to start when complying with OSHA Standards. This article is not intended to provide authoritative answers in OSHA compliance. To ensure OSHA compliance, please reference the relevant OSHA Standards at [osha.gov](https://www.osha.gov)

### Hazards

Crystalline Silica (quartz), and to a lesser extent cristobalite and tridymite, are minerals found in a wide variety of commonly used construction and manufacturing materials. OSHA estimates that about 2.3 million American workers are exposed to silica in their jobs.

Exposure to CS is recognized by the National Institutes of Health (NIH) and World Health Organization (WHO), and many other health organizations, to be linked to the risk of lung cancer. It can also cause illnesses such as chronic obstructive pulmonary disease (COPD), kidney disease, and silicosis, an incurable lung disease that can lead to disability and death. OSHA estimates that as many as 600 deaths and 900 new cases of silicosis will be prevented each year once the controls are completely implemented in 2021.

### Exposures

Only very small particles, less than 10 microns in diameter, are considered respirable and can penetrate into the lungs. A micron is equal to 1 millionth of a meter (about 39 millionths of an inch). These particles are generated during “high-energy” operations like cutting, sawing and grinding natural stone and concrete or when using industrial sand in manufacturing processes like glass making and casting.

OSHA has identified target industries with high-energy operations subject to the new CS standards. These include obvious operations and some that are not as clear. For example, construction and stone fabrication are likely affected but jewelry manufacturing and dental lab operations can also generate high levels of CS dust.

### Controls

The revised regulations will reduce the risk of disease caused by CS and provide the same protection for all workers covered by OSHA. OSHA established “Specified Exposure Control Methods When Working with Materials Containing Crystalline Silica” to make recommended controls easier to identify and follow; but not all suspected operations are identified in the specified control methods.

We recommend employers, through internal investigation of workplace hazards, determine where materials or processes in the workplace are likely to generate CS and implement appropriate exposure-limiting controls.

### Revised OSHA Exposure Levels

1. Permissible Exposure Limit (PEL) = 50 micrograms per cubic meter of air (50 µg/m<sup>3</sup>) averaged over an eight-hour day (TWA).  
Permissible Exposure Level is the legal limit in the U.S. for maximum concentration of a chemical in the air to which a worker may be exposed on an 8-hour time weighted average without danger to health and safety.
  - a. This level is the same for all workplaces covered by the general industry/maritime and construction standards
  - b. Significant risk remains at the new PEL but OSHA considers 50 µg/m<sup>3</sup> to be “the lowest level that can reasonably be achieved through engineering controls and work practices in most affected operations”
    - i. 50 µg/m<sup>3</sup> PEL will substantially reduce the risk of chronic and possible fatal illnesses
2. Action Level (AL) = 25 µg/m<sup>3</sup> TWA. Action level is the concentration of a chemical in the air, on an 8-hour time-weighted average, at which an employer must take required precautions to protect its workers.
  - a. OSHA standards do not apply when objective data (workplace or industry-wide air monitoring data) finds exposure to CS does not exceed the AL under any foreseeable conditions
  - b. OSHA provides acceptable standards for objective data and air monitoring



# Safety Zone



## Key Compliance Dates

OSHA adopted a staggered compliance schedule in an attempt to provide sufficient time, especially for small employers, to upgrade worker protection programs.

1. June 23, 2018: Employers are required to comply with all obligations of the standard
2. June 23, 2018: Employers are required to offer medical examinations to employees exposed above the PEL (50 µg/m<sup>3</sup> TWA) for 30 or more days a year
3. June 23, 2020: Employers are required to offer medical examinations to employees exposed at or above the AL (25 µg/m<sup>3</sup> TWA) for 30 or more days a year
4. Hydraulic fracturing, oil and gas industries
  - i. June 23, 2018 through June 23, 2021: Employers are not required to implement engineering controls to reduce the exposure below the PEL and can continue to have employees wear respirators if their exposures exceed the PEL
  - ii. June 23, 2021: Employers are required to comply with requirements for engineering controls to limit exposures to the new PEL

## Program Requirements

Employers must assess the exposure of each worker potentially exposed to CS at or above the AL (25 µg/m<sup>3</sup> TWA)

1. OSHA offers two methods an employer can assess employee exposure
  - a. Provide objective data proving the control methods used reduces CS exposure below the PEL (50 µg/m<sup>3</sup>)
  - b. Implement a scheduled air monitoring program
2. Written Plan
  - a. Implemented by a competent person as defined by the OSHA standard as follows:
    - i. Capable of identifying existing and foreseeable silica hazards
    - ii. Has the authority to take prompt corrective measures
    - iii. Makes frequent and regular inspections to ensure controls used and are in working order
  - b. Includes a description of the tasks in the workplace that involve exposure to CS
  - c. Includes a description of the controls implemented to limit employee exposure to CS
    - i. Each task: engineering controls, work practices, and respiratory protection
    - ii. Housekeeping measures
3. Task Specified Work Methods
  - a. Specified Exposure Control Methods When Working With Materials Containing Crystalline Silica
    - (1) Local exhaust ventilation (a vacuum system) with HEPA filter (99.97% @ 0.3 micrometers)
    - ii. Wet methods to suppress dust
  - b. Respirator requirements with Assigned Protection Factor 10 or greater (APF ≥10)
    - i. Respirator fit testing
    - ii. Employee training
4. Medical surveillance (exams) for employees
  - a. Employees required to wear a respirator for 30 or more days per year
5. Recordkeeping

# Safety Zone



OSHA has provided answers to frequently asked questions regarding the Respirable Crystalline Silica Rule on their website: [https://www.osha.gov/silica/Silica\\_FAQs\\_2016-3-22.pdf](https://www.osha.gov/silica/Silica_FAQs_2016-3-22.pdf)

One of many ways to locate qualified industrial hygienists to conduct air quality assessments is through the American Industrial Hygiene Association. They have an easy to use search engine on their website here: <https://www.aiha.org/about-ih/Pages/Find-an-Industrial-Hygienist.aspx>

Also note that free onsite consultation is available upon request from Federal OSHA and OSHA state plans to those employers who want help in establishing and maintaining a safe and healthful workplace. Largely funded by OSHA, the service is provided at no cost to the employer. The consultation service is delivered by state government agencies or universities employing professional safety consultants and health consultants. Comprehensive assistance includes an appraisal of work practices and environmental hazards of the workplace and all aspects of the employer's present job safety and health program. In many cases limited industrial hygiene work may be performed including air quality assessments. OSHA Consultation Services and Contact Information by State can be found here: <https://www.osha.gov/dcsp/smallbusiness/consult.html>

For additional information and resources on this topic and other safety and risk management subjects, visit the AmTrust Loss Control website: [www.amtrustfinancial.com/LossControl](http://www.amtrustfinancial.com/LossControl)

## CONTACT INFO:

PHONE: 888.486.7466 ext. 363275

WEB: [www.amtrustfinancial.com](http://www.amtrustfinancial.com)

EMAIL: [AskLC@amtrustgroup.com](mailto:AskLC@amtrustgroup.com)

MAILING ADDRESS: AmTrust North America - 2605 Enterprise Road, Suite 290, Clearwater, FL 33759

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